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THE

ONTARIO WATER RESOURCES

COMMISSION

WATER POLLUTION SURVEY

of the

TOWN OF KEMPTVILLE

UNITED COUNTIES OF LEEDS & GRENVILLE

1968

REPORT

on a

WATER POLLUTION SURVEY

of the

TOWN OF KEMPTVILLE

in the

United Counties of

Leeds and Grenville

1968

District Engineers Branch

Division of Sanitary Engineering

TOWN OF KEMPTVILLE

WATER POLLUTION SURVEY

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APPENDICES

WATER POLLUTION SURVEY OF THE TOWN OF KEMPTVILLE

INTRODUCTION

A water pollution survey was performed in the Town of Kemptville on July 19, 1967. Surveys of this nature are made routinely by the Ontario Water Resources Commission for the purpose of locating and recording sources of existing and potential water pollution. Inquiries and investigations were made with respect to outfalls which discharge to the various watercourses. Samples were collected to determine the significance of these outfalls and their effects on the receiving stream.

A similar OWRC survey was performed in Kemptville on May 8, 1962. The subsequent report produced the following recommendations:

1. "The Village of Kemptville should give serious consideration to the provision of improved sewage treatment facilities."

2. "A program should be instituted to exclude inadequately treated sewage flows from the storm sewer network."

Comments with respect to the action taken on these recommendations are included in this report.

A map of the Town of Kemptville showing pertinent receiving streams, outfalls thereto, and sampling points is appended to this report.

Valuable assistance was received from the following officials during this survey:

Mayor R.D. Raina, Town of Kemptville;

Mr. M.S. Moulton, Former Clerk-Treasurer, Town of Kemptville;

Mr. D. Horsley, Public Health Inspector, Leeds, Grenville and Lanark Health Unit.

TOWN OF KEMPTVILLE

The Town of Kemptville is located in the north-east part of Grenville County at the intersection of Highways 16 and 43. The Village of Kemptville became incorporated as a town in 1963 and has an assessed population of 2,142 according to the 1967 Municipal Directory. There was a town plan in effect and zoning by-laws were awaiting approval at the time of this survey.

KEMPTVILLE CREEK

Kemptville Creek, sometimes referred to as the South Branch of the Rideau River, flows in a northerly direction through Kemptville to the Rideau River. Drainage from the 320 acre town is either to Kemptville Creek or to a tributary known locally as Barnes Creek. At the time of this survey flow in the two creeks was minimal. The aesthetic conditions of both Kemptville Creek and Barnes Creek become less than desirable during the summer months when aquatic plant growth is abundant. Low flows, warm temperatures and nutrient build up are conditions conducive to the growth of aquatic plants.

The Rideau Valley Conservation Authority is investigating means of improving stream flow in Kemptville Creek. A report entitled "Preliminary Engineering Report on Stream Improvements on Kemptville Creek", has been prepared by James F. MacLaren Limited, Consulting Engineers, for the conservation authority.

WATER USES

Municipal

The town is served by a municipal water works which utilizes ground water as the source of supply. Chlorination treatment of the water is provided.

The south pumphouse, located at the corner of Prescott and Van Buren Streets, has a 209 foot deep drilled well (No. 1 well) and reservoir storage capacity of some 230,000 gallons. The north pumphouse located south of North Main Street, has a 192 foot deep well and a 140 foot deep well (No. 2 well and No. 3 well), and reservoir storage capacity of 200,000 gallons. The total capacity of the above three wells is approximately 288,000 gallons per day. A new well (No. 4 well) which will double the supply capacity is being developed on North Victoria Street.

Industrial

The water requirements of industry in Kemptville are generally provided by the municipal water system; however, some industries have supplementary supplies in use. The principle industries are noted as follows:

Name of Firm	Product
Moore Business Forms Ltd.	Printed forms
The Borden Co. Ltd.	Milk products
Kemptville Creameries	Milk products
Marvan Equipment Sales	Heavy equipment
United Co-op of Ontario	Feed and farm suppliers, Fertilizer

Recreational

With the exception of light boating and fishing the Kemptville Creek has little recreational attraction at Kemptville. The Rideau Provincial Park swimming beach and camping area is located downstream from Kemptville on the Rideau River opposite the mouth of Kemptville Creek. Low flows in Kemptville Creek limit the recreational use and the aesthetic attractiveness of the creek at Kemptville.

The consulting report entitled, "Preliminary Engineering Report on Stream Improvements on the Kemptville Creek", suggests that flow augmentation could be achieved at Kemptville through the provision of two reservoirs on the Kemptville Creek watershed at North Augusta and Cranberry Lake. It is estimated that these reservoirs should be capable of yielding a flow of 30 cubic feet per second (cfs) over a 90-day period. The report also points out that community ponds could be developed for Kemptville if the reservoirs are developed and flow augmentation practised.

WASTE DISPOSAL

Municipal Sewage Treatment Plant

The original municipal sewage treatment plant was built in 1947 and was designed to serve a population of 2,500 and to treat 20,000 gallons per day (GPD) from the Borden Co. Ltd. The total design flow was 270,000 GPD and treatment included screening, primary settling and sludge digestion.

Since the time of the 1962 OWRC water pollution survey improvements to this plant permitted an increase in plant design flow to 540,000 GPD which would serve a population of 4,300. Plant changes included a second primary settling tank, effluent chlorination, sludge heating facilities and improved instrumentation.

A review of the results of effluent samples between April 20, 1966 and June 13, 1967 showed the average biochemical oxygen demand (BOD) and suspended solids entering the creek were 280 and 140 parts per million (ppm), respectively. Waste effluent of this quality has an adverse effect on water quality when directed to a receiving stream like Kemptville Creek. It should be noted that this treatment plant was designed to treat normal raw sewage strengths of approximately 150 ppm for BOD and suspended solids.

During the above sampling period the raw sewage strength for BOD and suspended solids was an average of 620 ppm and 385 ppm, respectively. Industrial waste discharges are believed to be responsible for the abnormally high raw sewage strength.

Assuming a population of 3,000 by 1986, a load of 510 pounds per day of domestic BOD and 300 pounds per day of industrial BOD could be expected to reach the Kemptville sewage treatment plant. The BOD load to the receiving stream from the primary treatment plant would be 567 pounds per day, whereas the load from a secondary sewage treatment plant would be 81 pounds per day. To prevent the BOD in the stream from exceeding four (4) ppm, it would be necessary to have 50 cfs and 7 cfs dilution water for the primary and secondary effluents, respectively. Summer flows in Kemptville Creek at Kemptville have been reported to be virtually zero.

Industrial Waste Disposal

Industrial waste discharges are for the most part directed to the municipal sanitary sewer system. At the time of this survey no contaminated industrial waste discharges to the storm sewer system were located; however, it was reported that wastes of a milky nature were periodically observed in the creek upstream from the sewage treatment plant. The cooling water discharge from the Borden Co. Ltd. to Barnes Creek was found to be of acceptable sanitary quality for discharge to a receiving stream at this time. The temperature of the Borden cooling water was recorded as 43°C which resulted in increasing the water temperature of Barnes Creek from 30°C at Van Buren Street to 38°C at South Main Street at the time of the survey.

Industrial waste discharges to the sanitary sewers have considerably increased the raw sewage strength, thus reducing the operating efficiency of the municipal sewage treatment plant. The Town of Kemptville has been requested to provide a Sewer Use By-Law in an effort to control organic overloading of the treatment plant.

Private Sewage Disposal

No private sewage discharges to the watercourses or storm sewer system were located or reported during the survey. It was felt that most inadequately treated sewage flows had been excluded from the storm sewer system. Three out of four storm sewer outfalls noted in the previous survey were found to have little or no flow on July 19, 1962; however, the fourth storm sewer outfall at the rear of the municipal building (sampling point RK-35.88W) continued to discharge contaminated wastes. Four other municipal storm sewer outfalls located revealed no discharges on July 19, 1967.

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMS

The present methods for establishing water and/or sewage works programs are included in Appendix II of this report.

SAMPLING PROCEDURES

Samples were collected from all outfalls where significant flows were observed. Stream samples were collected at pertinent points in order to assess the influence of waste flows on the receiving stream.

All laboratory analyses were performed at the Ontario Water Resources Commission Laboratories in Toronto. The significance of these tests is included in Appendix I of this report and the tabulated laboratory results of samples collected on various occasions are included in Appendix III.

Seasonal weather conditions prevailed at the time of the survey. There was no precipitation and dry weather flows were experienced.

SAMPLE RESULTS AND OBSERVATIONS

Municipal Sewer System

Excessively high BOD and suspended solids concentrations are characteristic of the municipal sewage treatment plant effluent. High bacteriological counts in the effluent samples indicate inadequate chlorination treatment at the time of sampling. The discharge from the sewage treatment plant is contributing to the pollution of Kemptville Creek. The OWRC water quality monitoring program for Kemptville Creek (Sampling Point at Highway 43) has frequently indicated water quality not within the objectives for surface water in Ontario. The above monitoring program indicates that with a flow augmentation to 30 cfs there would still be required a higher than primary degree of treatment at Kemptville to maintain acceptable water quality conditions. Since existing flow data does not guarantee that even a flow of 30 cfs could be maintained, it is obvious that a minimum of secondary treatment is required. However, it should be recognized that even with secondary treatment, a nutrient and reduced algae problem would still exist. Without flow augmentation, tertiary treatment would be desirable. The consulting firm of Gore and Storrie Limited has been authorized by Kemptville to study improvements to the sewage treatment system.

Contaminated wastes were present in the storm sewer discharge at the rear of the municipal building. The high BOD and coliform bacteria count indicate the presence of sewage.

Stream Quality

Both Kemptville Creek and Barnes Creek were within the objectives for surface water quality in Ontario at the upstream sampling points. No appreciable changes were noted in the water quality immediately upstream from the sewage treatment plant, although bacteriological concentrations did fluctuate slightly. Downstream from the sewage treatment plant sharp increases can be detected with respect to bacteriological concentrations, BOD, suspended solids and nitrogen

Kemptville at Highway No. 43 is not within the accepted objectives for surface water quality.

Aquatic plant growth was prevalent in both Kemptville Creek and Barnes Creek at the time of this survey. This growth is stimulated by low flows, warm temperatures and nutrient build-up. The Borden Co. Ltd. cooling water, while not a sanitary contaminant at this time, may contribute to biological activity because of its high temperature.

The determinations for dissolved oxygen content in the streams at the time of the survey are recorded as follows:

Sampling Point	Water Temperatures (°C)	Dissolved Oxygen Content (ppm)	% Saturation
RK-35.30	27	7.0	80
RK-35.48	28	9.0	114
RK-35.56	29	9.0	115
RK-35.90	28	11.0	139
RK-36.17	28	10.0	127
RKB-35.74	38	8.0	120
RKB-35.92	30	11.0	145

Note: For description of sampling points see Appendix III.

SUMMARY AND CONCLUSIONS

A municipal water pollution survey at the Town of Kemptville was conducted on July 19, 1967. The assistance provided by various municipal officials during this survey is gratefully acknowledged.

Two recommendations in a previous water pollution survey dated May 8, 1962, concerning improvements to the sewage treatment facilities and exclusion of contaminated wastes from the storm sewers have received attention. The 1967 survey revealed that inadequately treated wastes continue to discharge from a storm sewer to Kemptville Creek at the rear of the municipal building. The source of this discharge should be located and eliminated.

Investigations revealed that the effluent from the Kemptville primary treatment plant is contributing to the pollution of Kemptville Creek. The pending sewage report by the town's consulting engineer will no doubt present a program for resolving this problem. However, even with improved treatment it still will be necessary to enact a Sewer Use By-Law. Also the proposal for two storage reservoirs and the subsequent augmentation of flows in Kemptville Creek would improve the assimilation ability of the receiving stream, as well as unpleasant aesthetic conditions. It should also be appreciated that secondary treatment will not completely eliminate nutrient build-up and the associated nuisance algae production in Kemptville Creek.

RECOMMENDATIONS

1. The Town of Kemptville should take active steps to reduce the pollution of Kemptville Creek from the municipal sewage works.

2. The municipal sewage treatment plant should be upgraded to provide a degree of treatment comparable to at least secondary treatment.

3. A Sewer Use By-Law should be adopted and enforced by the municipality to reduce overloading and encourage the effective operation of the sewage works.

4. The Town of Kemptville should support any scheme which would improve flows in Kemptville Creek. Such an improvement would increase the assimilation ability of the stream, and reduce unpleasant aesthetic conditions.

5. The contaminated discharge from a storm sewer at the rear of the municipal building should be eliminated.

Report Prepared By: W.C. Stevens

W.C. Stevens, Technician,
Div. Sanitary Engineering.

WCS/jn

APPENDIX I

Significance of Laboratory Analyses

Bacteriological Examination

The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. The objectives for surface water quality in Ontario is a maximum of 2400 organisms per 100 millilitres.

The OWRC Laboratories employ the Membrane Filter (MF) technique of examination to obtain a direct enumeration of coliform organisms. The Department of Health Laboratories use the Most Probable Number (MPN) enumeration and coliform counts are reported as Total Coliform Organisms (TC) and Faecal Coliform Organisms (FC).

Sanitary Chemical Analyses

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is reported in parts per million (ppm) and is an indication of the amount of oxygen required for the stabilization of decomposable organic or chemical matter in water. The completion of the laboratory test required five days, under the controlled incubation temperature of 20^{o} Centigrade.

The OWRC objective for surface water quality is an upper limit of four (4) ppm.

Solids

The value for solids, expressed in parts per million, is the sum of the values for the suspended and the dissolved matter in the water. The concentration of suspended solids is generally the most significant of the solids analyses with regard to surface water quality. The effects of suspended solids in water are reflected in difficulties associated with water purification, deposition in streams and injury to the habitat of fish.

Nitrogen

Ammonia Nitrogen or sometimes called free ammonia is the insoluble produce in the decomposition of nitrogenous organic matter. It is also formed when nitrates and nitrites are reduced to ammonia either biologically or chemically. Some small amounts of ammonia, too, may be swept out of the atmosphere by rain water.

The following values may be of general significance in appraising free ammonia content: Low 0.015 to 0.03 ppm; moderate 0.03 to 0.10 ppm; high 0.10 or greater.

Total Kjeldahl is a measure of the total nitrogeneous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia Nitrogen measures the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

Nitrite Nitrogen

Nitrite is usually an intermediate oxidation produce of ammonia. The significance of nitrites, therefore, varies with their amount, sources, and relation to other constituents of the sample, notably the relative magnitude of ammonia and nitrate present. Since nitrite is rapidly and easily converted to nitrate, its presence in concentrations greater than a few thousandths of a part per million is generally indicative of active biological processes in the water.

Nitrate Nitrogen

Nitrate is the end produce of aerobic decomposition of nitrogenous matter, and its presence carries this significance. Nitrate concentration is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

The following ranges in concentration may be used as a guide: Low - less than 0.1 ppm; moderate - 0.1 to 1.0 ppm; high - greater than 1.0 ppm.

Anionic Detergents as ABS

The presence of anionic detergents as ABS is an indication that domestic waste is present.

Phenols

The presence of phenol or phenolic equivalents is generally associated with discharges containing petroleum products, or with wastes from some industries. It is generally conceded that adequate protection of surface waters will be provided if the concentration of phenols in waste discharges does not exceed 20 parts per billion (ppb). Phenolic type waste can cause objectionable conditions in water supplies and might taint the flesh of fish.

Iron

Water for domestic use should contain less than 0.3 parts per million of iron in order to avoid objectionable tastes, staining and sediment formation. Iron concentrations of not greater than 17 parts per million in waste discharges should permit adequate protection of surface waters.

Prepared By: L. South
for W. C. Stevens,
Technician,
Division of Sanitary Engineering.

APPENDIX I

SIGNIFICANCE OF LABORATORY ANALYSES

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APPENDIX

IMPLEMENTATION OF WATER AND SEWAGE WORKS PROGRAMS

Currently, there are three general methods which may be utilized for implementing sewage and water works programs. These are: 1) to enter into an agreement with the OWRC for the construction of the treatment and collector works with an obligation to pay the debt retirement and operating charges over the term of the agreement with the facility reverting to the municipality at the end of the term of the agreement, 2) by requesting the provision of service from a Provincially-owned project, and 3) by proceeding with the construction independently and meeting capital costs by the sale of debentures.

OWRC/MUNICIPAL PROJECTS

For the construction of water and sewage works under agreement with this Commission, the works are provided and developed under Sections 39 to 46 of the Ontario Water Resources Commission Act.

For this type of arrangement, the Commission utilizes a sinking fund and consequently the annual payments are based on a specific debt retirement period and the payments are unchanged for the period of the agreement. This type of project may be financed over a period of time up to a maximum of thirty years. The annual charges for projects constructed under this agreement are determined as follows:

1. Capital Repayment

   As noted, OWRC financing is by the sinking fund method and an annual payment of approximately 2 per cent of the capital

cost is required to retire a debt over a thirty-year period.

2. Interest

On new Commission projects, interest is calculated at the current rate.

3. Reserve Fund

To provide money for repairs and replacements, Section 40 of The Ontario Water Resources Commission Act provides for the establishment of a reserve fund by the Commission. It is important to note that this fund is established in the name of the municipality and the balance consequently earns interest. It has now been established by Commission minute that the reserve fund billing for each project shall continue only until the fund reaches an amount of ten times the initial annual billing and the reserve fund billing shall be re-imposed only when the fund has been depleted to 80 per cent or less of the maximum amount.

4. Operating Costs

Under OWRC agreement, the municipality is responsible only for the operating costs directly attributed to the project in the municipality. Therefore, no charges are made by the Commission for the services of head office personnel who are available as required to advise on the satisfactory operation and maintenance of the project.

PROVINCIALLY-OWNED WORKS

In June, 1967, the Honourable J. R. Simonett, Minister of Energy and Resources Management, made an announcement which expanded the authorization of this Commission for the provision of water supply and sewage treatment facilities. This new program allows the Commission to construct entire water and sewage works facilities for small municipalities. The capital costs of these can be amortized over a 40 year period.

A slight variation of this program could be implemented in that the municipality may request that this Commission provide only the major water and sewage works facilities as Provincially-owned works, and develop the water distribution and sewage collector systems under the standard type of Commission project. It would appear that where applicable, it would be more advantageous for the municipality to proceed on the basis of requesting this Commission to develop entire systems as Provincially-owned works.

The associated cost of supplying these works, including amortization of capital costs, together with operating and maintenance charges, will be recovered by the sale of service to the affected municipalities by rates determined on a usage basis. These facilities will be wholly-owned by the Province of Ontario and the arrangements for service will be formalized by contracts between the Commission and the municipality concerned. The installations will be operated entirely at cost with appropriate provision for adjustment in rate.

DEVELOPMENT

If a municipality, after considering the alternatives, wishes this Commission to consider Provincially-financed projects, application forms should be completed and submitted together with a resolution of the Municipal council. A draft of the suggested wording of the resolution is included with the application forms.

If the proposed works are to be built by the municipality on its own initiative or as a formal project under agreement with this Commission, it is required that the Council retain a consulting engineer to prepare preliminary engineering reports on the proposed work. If a Provincial system is contemplated, no action should be taken with respect to retaining a consulting engineering firm as the Commission will designate a consulting engineer to carry out the Provincial portion of the work and it would be advantageous if the municipal portion be studied and reported on by the same engineer.

APPENDIX III

TOWN OF KEMPTVILLE

WATER POLLUTION SURVEY

SAMPLE RESULTS

SAMPLE POINT NO.	DESCRIPTION	DATE	COLIFORM BACTERIA PER 100 ML	5-DAY BOD	SOLIDS			NITROGEN AS N				ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	IRON AS FE
					TOTAL	SUSP.	DISS	FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE			
RK-34.90	KEMPTVILLE CREEK-DOWN STREAM FROM KEMPTVILLE AT HIGHWAY No. 43	DEC. 1/64	1,600	2.6	---	7.0	---	---	---	---	---	---	---	---
		JUNE 16/65	9,100	2.9	---	5.0	---	---	---	---	---	---	---	---
		JULY 8/65	1,900	7.2	---	17.0	---	---	---	---	---	---	---	---
		JULY 28/65	40,000	14.0	---	26.0	---	---	---	---	---	---	---	---
		AUG. 18/65	23,000	12.0	---	61.0	---	---	---	---	---	---	---	---
		SEPT. 16/65	59,000	10.8	---	32.0	---	---	---	---	---	---	---	---
		OCT. 21/65	108,000	3.6	---	---	---	---	---	---	---	---	---	---
		MAR. 10/66	6,000	2.2	---	15.0	---	---	---	---	---	---	---	---
		MAY 18/66	7,000	2.0	---	40.0	---	---	---	---	---	---	---	---
		JUNE 27/66	12,000	4.2	---	15.0	---	---	---	---	---	---	---	---
		AUG. 5/66	650	---	---	---	---	---	---	---	---	---	---	---
		APR. 18/66	14,200	1.8	---	15.0	---	---	---	---	---	---	---	---
		SEPT. 6/66	6,000	13.0	---	24.0	---	---	---	---	---	---	---	---
		OCT. 26/66	41,000	27	364	44	---	3.28	5.00	0.00	0.10	---	---	1.15
		APR. 17/67	39,000	2.1	---	5	---	0.13	0.84	0.00	0.20	---	---	0.11
		MAY 8/67	34,000	3.9	256	<15	---	0.36	1.40	0.01	0.10	---	2	0.19
		JUNE 5/67	---	2.2	164	6	---	---	---	---	---	---	---	---
		JULY 4/67	560,000	1.8	240	2	---	0.26	1.80	0.01	0.20	---	---	---
		JULY 31/67	7,300	2.0	268	19	---	1.48	1.80	0.00	0.10	---	---	---

UNLESS OTHERWISE INDICATED ALL RESULTS ARE RECORDED IN PPM.

TOWN OF KEMPTVILLE

WATER POLLUTION SURVEY

SAMPLE POINT NO.	DESCRIPTION	DATE	COLIFORM BACTERIA PER 100 ML	5-DAY BOD	SOLIDS TOTAL	SOLIDS SUSP.	SOLIDS DISS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	IRON AS Fe
RK-35.30	KEMPTVILLE CREEK - NEAR DOWNSTREAM TOWN BOUNDARY	MAY 8/62	13,400	2.7	212	---	---	---	---	---	---	---	---	---
		JULY 19/67	1,080	1.4	302	4	298	0.12	1.28	0.00	0.18	0.0	---	---
RK-35.39 T	KEMPTVILLE MUNICIPAL SEWAGE TREATMENT PLANT- EFFLUENT	APR.20/66	---	620	---	150	---	---	---	---	---	---	---	---
		MAY 8/66	---	64	---	41	---	---	---	---	---	---	---	---
		MAY 17/66	---	98	---	228	---	---	---	---	---	---	---	---
		JUNE 16/66	316	---	---	---	---	---	---	---	---	---	---	---
		AUG. 4/66	---	920	---	236	---	---	---	---	---	---	---	---
		AUG. 8/66	36,000,000	---	---	---	---	---	---	---	---	---	---	---
		SEPT.19/66	14,500,000	---	---	---	---	---	---	---	---	---	---	---
		SEPT.21/66	---	260	---	108	---	---	---	---	---	---	---	---
		OCT. 10/66	440,000,000	---	---	---	---	---	---	---	---	---	---	---
		OCT. 20/66	---	160	---	90	---	---	---	---	---	---	---	---
		NOV. 15/66	---	190	---	92	---	---	---	---	---	---	---	---
		DEC. 14/66	---	34	---	37	---	---	---	---	---	---	---	---
		JAN. 19/67	---	60	---	85	---	---	---	---	---	---	---	---
		FEB. 20/67	---	230	---	109	---	---	---	---	---	---	---	---
		MAR. 13/67	---	228	---	216	---	---	---	---	---	---	---	---
		MAY 15/67	---	124	---	51	---	---	---	---	---	---	---	---
		JUNE 13/67	---	651	---	341	---	---	---	---	---	---	---	---
		JULY 12/67	---	378	1046	248	798	---	---	---	---	---	---	---
		JULY 19/67	700,000,000	240	1074	94	980	18.0	35.0	0.20	0.02	3.1	0	---
		AUG. 1/67	---	365	960	166	794	---	---	---	---	---	---	---
		SEPT.18/67	---	530	1086	172	914	---	---	---	---	---	---	---

UNLESS OTHERWISE INDICATED ALL RESULTS RECORDED IN PPM.

TOWN OF KEMPTVILLE

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SAMPLE POINT NO.	DESCRIPTION	DATE	COLIFORM BACTERIA PER 100 ML	5-DAY BOD	SOLIDS			NITROGEN AS N				ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	IRON AS Fe
					TOTAL	SUSP.	DISS	FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE			
RK-35.48	KEMPTVILLE CREEK UPSTREAM FROM SEWAGE TREATMENT PLANT (BELOW CONFLUENCE WITH BARNES CREEK)	MAY 8/62	1300	1.9	238	---	---	---	---	---	---	---	---	---
		JULY 19/67	170	1.2	308	4	304	0.16	1.28	0.00	0.13	0.0	---	---
RK-35.52 S	SEWAGE PUMPING STATION OPPOSITE PARLIAMENT ST. BY-PASS	JULY 19/67	N	0	F	L	0	W						
RK-35.56	KEMPTVILLE CREEK- ABOVE CONFLUENCE WITH BARNES CREEK	JULY 19/67	90	1.4	320	1	319	0.03	1.28	0.01	0.16	0.0	---	---
RK-35.56 W	STORM SEWER TO KEMPTVILLE CREEK AT JACK STREET	JULY 19/67	N	0	F	L	0	W						
RK-35.77 W	STORM SEWER TO KEMPTVILLE CREEK OPPOSITE HENRY ST.	JULY 19/67	N	0	F	L	0	W						
RK-35.82 W	STORM SEWER TO KEMPTVILLE CREEK AT THOMAS STREET	MAY 8/62	5,300,000	43	1026	66	960	---	---	---	---	---	---	---
		JULY 19/67	INSUFFICIENT FLOW FOR SAMPLING											

UNLESS OTHERWISE INDICATED ALL RESULTS RECORDED IN PPM.

TOWN OF KEMPTVILLE

WATER POLLUTION SURVEY

SAMPLE POINT NO.	DESCRIPTION	DATE	COLIFORM BACTERIA PER 100 ML	5-DAY BOD	SOLIDS TOTAL	SOLIDS SUSP	SOLIDS DISS	NITROGEN AS N FREE AMMONIA	NITROGEN AS N TOTAL KJELDAHL	NITROGEN AS N NITRITE	NITROGEN AS N NITRATE	ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	IRON AS FE
RK-35.87 W	STORM SEWER TO KEMPTVILLE CREEK OPPOSITE WEST STREET	MAY 8/62	243,000,000	45	704	90	614	---	---	---	---	---	---	---
		JULY 19/67	INSUFFICIENT FLOW FOR SAMPLING											
RK-35.88	STORM SEWER TO KEMPTVILLE CREEK AT REAR OF MUNICIPAL BUILDING-FROM SOUTH WATER STREET	MAY 8/62	5,000	50	578	16	562	---	---	---	---	---	---	---
		JULY 19/67	50,000	40	666	77	589	0.03	1.70	0.04	0.02	0.2	3	---
RK-35.90 W-1	STORM SEWER TO NORTH SIDE OF KEMPTVILLE CREEK AT PRESCOTT ST.	JULY 19/67	N O F L O W											
RK-35.90 W-2	STORM SEWER TO SOUTH SIDE OF KEMPTVILLE CREEK AT PRESCOTT STREET	MAY 8/62	87,000	9.2	400	70	330	---	---	---	---	---	---	---
		JULY 19/67	N O F L O W											
RK-35.90	KEMPTVILLE CREEK - AT PRESCOTT STREET	JULY 19/67	34,000	1.3	276	2	274	0.03	1.68	0.00	0.17	---	---	---
RK-36.13 W	STORM SEWER TO NORTH SIDE OF KEMPTVILLE CREEK ADJACENT TO WATER WORKS	JULY 19/67	N O F L O W											
RK-36.13 W	KEMPTVILLE CREEK - NEAR UPSTREAM TOWN BOUNDARY	JULY 19/67	70	1.3	300	2	298	0.23	0.78	0.00	0.12	0.0	---	---

UNLESS OTHERWISE INDICATED ALL RESULTS RECORDED IN PPM

TOWN OF KEMPTVILLE

WATER POLLUTION SURVEY

SAMPLE POINT NO.	DESCRIPTION	DATE	COLIFORM BACTERIA PER 100 ML	5-DAY BOD	SOLIDS			NITROGEN AS N				ANIONIC DETERGENTS AS ABS	PHENOLS IN PPB	IRON AS FE
					TOTAL	SUSP	DISS	FREE AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE			
RKB-35.74	BARNES CREEK - AT SOUTH MAIN STREET	MAY 8/62	230	1.9	362	---	---	---	---	---	---	---	---	---
		JULY 19/67	180	1.0	482	5	477	0.10	1.28	0.04	1.0	---	---	---
RKB-35.88 I	BORDEN'S COOLING WATER DISCHARGE TO BARNES CREEK	MAY 8/62	7000	5.2	364	---	---	---	---	---	---	---	---	---
		JULY 10/67	1900	1.3	460	11	499	0.23	1.42	0.06	1.15	0.0	---	---
RKB-35.92	BARNES CREEK - AT VAN BUREN STREET	MAY 8/62	80	2.1	358	---	---	---	---	---	---	---	---	---
		JULY 19/67	50	2.9	518	10	508	0.55	1.68	0.02	1.10	---	---	---

UNLESS OTHERWISE INDICATED ALL RESULTS RECORDED IN PPM.


CONCESSION RD. HWY. No. 43
TOWN LIMIT
KEMPTVILLE CREEK
BARNES CREEK
WATER WORKS
SEWAGE TREATMENT PLANT
SEWAGE PUMPING STATION
CEMETERY
CANADIAN PACIFIC RAILWAY
AGRICULTURAL SCHOOL PROPERTY
RK-34·90
RK-35·30
RK-35·30 T
RK-35·46
RK-35·52 S
RK-35·56
RK-35·56 W
RK-35·77 W
RK-35·82 W
RK-35·88 W
RK-35·87 W
RK-35·90
RK-35·90 W-1
RK-35·90 W-2
RK-36·13 W
RK-36·17
RKB-35·74
RKB-35·88 I
RKB-35·92
LEGEND
RK-35·17 – STREAM SAMPLING POINT SHOWING MILEAGE
RKB-35·88 T – OUTFALL SHOWING STREAM AND MILEAGE – TYPE OF OUTFALL
I – INDUSTRIAL WASTE EFFLUENT
S – SANITARY SEWER
T – TREATMENT PLANT EFFLUENT
W – STORM SEWER
ONTARIO WATER RESOURCES COMMISSION
TOWN OF KEMPTVILLE
WATER POLLUTION SURVEY
1967
SCALE 200 0 200 400 FEET
DRAWN BY: L. L. BROOME
DATE: MARCH, 1968
CHECKED BY: A. D. M.
DRAWING No: 68-36